ABSTRACT

An implantable medical device for optically sensing action potential signals in excitable body tissue. The device includes an elongated tubular lead body carrying an optical fiber extending from a proximal lead end to a distal lead end to position the optical fiber at a target site. The lead body additionally carries a conduit for dispensing a voltage-sensitive fluorescent dye into tissue surrounding the target site. The optical fiber transmits excitation light to the fluorescent dye to cause the dye to fluoresce with varying intensity as the transmembrane potentials of local tissue cells vary due to passing depolarization wavefronts. The optical fiber transmits the fluorescence signal to the device to generate an action potential signal or fiducial points of an action potential signal for use in accurately measuring and characterizing electrical activity of excitable tissue.